National Institute of Environmental Health Sciences

The role of weather on the relation between influenza and influenza-like illness

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Abstract:

Influenza epidemics, enabled by viral antigenic drift, occur invariably each winter in temperate climates. However, attempts to correlate the magnitude of virus change and epidemic size have been unsatisfactory. The incidence of influenza is not typically measured directly, but rather derived from the incidence of influenza-like illness (ILI), a clinical syndrome. Weather factors have been shown to influence the manifestation of influenza-like symptoms. We fitted an influenza transmission model to time series of influenza-like illness as monitored from 2003 to 2010 by two independent symptomatic surveillance systems (Influenzanet and EISN) in three European countries. By assuming that seasonality only acts upon the manifestation of symptoms, the model shows a significant correlation between the absolute humidity and temperature at the time of infection, and the proportion of influenza infections fulfilling the clinical ILI case definition, the so-called ILI factor. When a weather-dependent ILI factor is included in the model, the epidemic size of influenza-like illness becomes dependent not only on the susceptibility of the population at the beginning of the epidemic season but also on the weather conditions during which the epidemic unfolds. The combination reduces season-to-season variation in epidemic size and, interestingly, leads to a non-monotonic trend whereby the largest ILI epidemic occurs for moderate initial susceptibility.

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Resource Description

Exposure :

weather or climate related pathway by which climate change affects health

Temperature

Temperature: Fluctuations

Geographic Feature:

resource focuses on specific type of geography

None or Unspecified

Geographic Location:

resource focuses on specific location

Non-United States

Non-United States: Europe

European Region/Country: European Country

Other European Country : The Netherlands; Belgium; Portugal

Health Impact: ☒

specification of health effect or disease related to climate change exposure

Infectious Disease

Infectious Disease: Airborne Disease

Airborne Disease: Influenza

Resource Type: ☒

format or standard characteristic of resource

Research Article

Timescale: ☒

time period studied

Time Scale Unspecified